

Ephemeris for Physical Observations of Mars, 1877.
By Mr. A. Marth.

Greenwich Noon. 1877.	Angle of Position of ♂'s Axis.	Areographical Western Long. Latitude of the Centre of ♂'s Disk. Diff.		Diameter.	Amount and Position of Greatest Defect of Illumination.		Areocentric Angle between Earth and Sun.
	°	°	°	"	"	°	°
June 9	348°55	269°77	700°70 -24°19	12°76	1°72	249°91	43°09
11	347°85	250°47	°71 24°27	13°00	1°74	249°80	42°91
13	347°17	231°18	°73 24°33	13°24	1°75	249°72	42°70
15	346°50	211°91	°76 24°38	13°49	1°77	249°65	42°47
17	345°85	192°67	°77 24°41	13°74	1°78	249°59	42°22
19	345°22	173°44	°80 24°44	14°00	1°79	249°55	41°94
21	344°60	154°24	°82 24°45	14°27	1°80	249°53	41°64
23	344°00	135°06	°84 24°45	14°54	1°81	249°52	41°31
25	343°42	115°90	°88 24°44	14°82	1°81	249°53	40°96
27	342°87	96°78	°90 24°42	15°11	1°82	249°55	40°58
29	342°33	77°68	°93 24°39	15°40	1°82	249°59	40°17
July 1	341°81	58°61	700°97 -24°35	15°70	1°81	249°65	39°74
3	341°32	39°58	701°00 24°30	16°01	1°81	249°73	39°27
5	340°85	20°58	°04 24°24	16°33	1°80	249°83	38°77
7	340°41	1°62	°07 24°18	16°65	1°78	249°95	38°23
9	339°99	342°69	°12 24°11	16°97	1°77	250°08	37°65
11	339°60	323°81	°16 24°03	17°31	1°75	250°24	37°04
13	339°23	304°97	°20 23°95	17°65	1°72	250°42	36°39
15	338°89	286°17	°25 23°68	17°99	1°69	250°63	35°69
17	338°57	267°42	°30 23°77	18°34	1°65	250°86	34°96
19	338°29	248°72	°34 23°68	18°69	1°61	251°12	34°18
21	338°03	230°06	°40 23°58	19°05	1°57	251°40	33°36
23	337°80	211°46	°44 23°49	19°41	1°52	251°72	32°49
25	337°60	192°90	°50 23°39	19°77	1°46	252°08	31°57

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Greenwich Noon. 1877.	Angle of Position of δ 's Axis.	Areographical Western Long. of the Centre of δ 's Disk.		Diameter.	Amount and Position of Greatest Defect of Illumination.		Areocentric Angle between Earth and Sun
	$^{\circ}$	$^{\circ}$	Diff. $^{\circ}$	"	"	$^{\circ}$	$^{\circ}$
July 27	337.43	174.40		20.14	1.40	252.47	30.61
			.55				
29	337.29	155.95		20.50	1.34	252.90	29.60
			.61				
31	337.18	137.56		20.87	1.27	253.38	28.54
			.66				
Aug. 2	337.10	119.22		21.23	1.19	253.92	27.42
			701.73				
4	337.05	100.95		21.58	1.11	254.52	26.25
			.78				
6	337.04	82.73		21.93	1.03	255.19	25.03
			.84				
8	337.06	64.57		22.27	0.94	255.95	23.76
			.90				
10	337.11	46.47		22.60	0.86	256.79	22.44
			701.96				
12	337.19	28.43		22.91	0.77	257.77	21.06
			702.01				
14	337.30	0.44		23.21	0.68	258.92	19.64
			.06				
16	337.44	352.50		23.49	0.59	260.25	18.18
			.10				
18	337.61	334.62		23.75	0.50	261.82	16.68
			.16				
20	337.81	316.78		23.98	0.42	263.70	15.15
			.21				
22	338.04	298.99		24.19	0.34	266.01	13.60
			.24				
24	338.29	281.23		24.37	0.27	268.92	12.03
			.28				
26	338.56	263.51		24.52	0.21	272.70	10.46
			.32				
28	338.85	245.83		24.63	0.15	277.78	8.92
			.34				
30	339.16	223.17		24.71	0.10	284.9	7.45
			.35				
Sept. 1	339.48	210.52		24.76	0.07	295.2	6.13
			702.37				
3	339.81	192.89		24.76	0.05	310.5	5.08
			.38				
5	340.15	175.27		24.73	0.04	331.4	4.52
			.37				
7	340.50	157.64		24.66	0.04	354.2	4.64
			.37				
9	340.84	140.01		24.56	0.05	13.2	5.39
			.35				
11	341.17	122.36		24.41	0.08	26.5	6.55
			.33				
13	341.50	104.69		24.23	0.12	35.5	7.92
			.30				
15	341.81	86.99		24.02	0.16	41.80	9.39
			.27				
17	342.10	69.26		23.78	0.21	46.33	10.91
			.23				

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Greenwich Noon. 1877.	Angle of Position of ♂'s Axis. °	Areographical Western Long. of the Centre of ♂'s Disk. °	Latitude of ♂'s Disk. °	Diameter. "	Amount and Position of Greatest Defect of Illumination. °	Areocentric Angle between Earth and Sun. °
pt. 19	342°38	51°49	-23°02	23°52	0°27	49°74
21	342°63	33°68	23°13	23°22	0°34	52°39
23	342°86	15°82	23°25	22°91	0°41	54°51
25	343°06	357°92	23°38	22°57	0°49	56°23
27	343°23	339°96	23°51	22°22	0°57	57°67
29	343°37	321°94	23°65	21°85	0°64	58°87
Oct. 1	343°47	303°87	-23°80	21°47	0°72	59°90
3	343°54	285°75	23°95	21°09	0°80	60°78
5	343°58	267°57	24°11	20°69	0°87	61°54
7	343°59	249°32	24°27	20°29	0°94	62°20
9	343°56	231°02	24°44	19°89	1°01	62°78
11	343°49	212°66	24°61	19°49	1°07	63°28
13	343°39	194°24	24°78	19°09	1°13	63°72
15	343°26	175°76	24°96	18°69	1°18	64°11
17	343°10	157°23	25°14	18°29	1°23	64°44
19	342°90	138°64	25°32	17°90	1°27	64°74
21	342°67	120°00	25°50	17°52	1°31	64°99
23	342°41	101°31	25°68	17°14	1°35	65°21
25	342°13	82°57	25°85	16°77	1°38	65°41
27	341°82	63°78	26°03	16°40	1°40	65°57
29	341°49	44°95	26°20	16°04	1°42	65°72
31	341°13	26°07	26°37	15°69	1°44	65°84
Nov. 2	340°74	7°15	-26°53	15°35	1°46	65°94
4	340°34	348°19	26°69	15°02	1°47	66°03
6	339°92	329°18	26°84	14°70	1°48	66°10
8	339°47	310°14	26°99	14°38	1°48	66°16
10	339°01	291°06	27°12	14°07	1°48	66°21

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Greenwich Noon. 1877.	Angle of Position of ♂'s Axis.	Areographical Western Long. Latitude of the Centre of ♂'s Disk.		Diameter.	Amount and Position of Greatest Defect of Illumination.		Areocentric Angle between Earth and Sun
	°	°	Diff. °	"	"	°	°
Nov. 12	338°53	271°95	—27°25	13'77	1'48	66°25	38°29
			·86				
14	338°04	252°81	27°37	13'48	1'48	66°28	38°68
			·82				
16	337°54	233°63	27°49	13'20	1'47	66°31	39°03
			·79				
18	337°02	214°42	27°59	12'92	1'47	66°33	39°35
			·76				
20	336°49	195°18	27°68	12'66	1'46	66°35	39°65
			·74				
22	335°95	175°92	27°76	12'40	1'45	66°36	39°93
			·71				
24	335°40	156°63	27°84	12'14	1'43	66°37	40°18
			·69				
26	334°85	137°32	27°89	11'90	1'42	66°38	40°41
			·67				
28	334°29	117°99	27°94	11'66	1'40	66°39	40°61
			·64				
30	333°73	98°63	27°98	11'43	1'39	66°40	40°79
			·62				
Dec. 2	333°16	79°25	—28°00	11'21	1'37	66°41	40°96
		700°61					
4	332°59	59°86	28°01	10'99	1'35	66°42	41°10
			·59				
6	332°02	40°45	28°00	10'78	1'34	66°43	41°22
			·57				
8	331°45	21°02	27°98	10'58	1'32	66°45	41°33
			·55				
10	330°88	1°57	27°95	10'38	1'30	66°47	41°41
			·54				
12	330°32	342°11	27°91	10'18	1'28	66°49	41°48
		700°54					
14	329°75	322°65	—27°85	10'00	1'26	66°52	41°54
1877	April 24	Autumnal Equinox of <i>Mars</i> ' northern hemisphere.					
1877	Sept. 18	Winter Solstice					
1878	Feb. 22	Spring Equinox					

The following list gives the areographic longitude and latitude of the centre of the disk of *Mars*, and also its apparent diameter, for the times of a number of sketches made during the oppositions of 1862 and 1864. Not to make it too lengthy, it is confined to the sketches of—

- Dawes* (8 sketches in vol. 25 of the *Monthly Notices*, p. 225).
- Von Franzenau* (6 in vol. 51 of the *Sitzungsberichte* of the Vienna Academy, p. 509)
- Harkness* (2 in the Washington Observations of 1862, p. 152).
- Kaiser* (2 plates with respectively 9 and 12 sketches in vol. 3 of the *Annalen de Sternwarte in Leiden*).
- Lassell* (2 plates with 24 sketches in vol. 32 of the *Memoirs of the Royal Astronomical Society*).
- Lockyer* (4 plates with 16 sketches in the same volume).
- Rosse* (6 sketches made at Lord Rosse's Observatory, published in the same volume)
- Secchi* (8 sketches made by Secchi or Cappelletti, and published in Tav. V. p. 76 of *Memorie del Osservatorio d. Coll. Rom. Nuova Serie. Roma, 1863*).

The sketches are arranged in the order of the longitudes of their central meridians.

Areographical
Long. and Lat. of the
Centre of the Disk.

Diameter.

Times assigned to the Sketches.

1.1	-21.2	22.8	Lassell 3	1862 Sept. 22.44	Gr.
5.7	-25.2	19.8	„ 16	Oct. 27.31	„
6.5	- 2.2	17.0	Franzenau 2	64 Nov. 10 9 ^h 30 ^m	Vienna.
12.1	-22.1	23.0	Harkness 2	62 Sept. 30 11 ^h	Washgt.
12.1	-21.3	22.9	Lockyer I. 2	23 11 ^h 55 ^m	Gr.
18.8	-21.0	22.7	Lassell 2	20.44	„
19.7	-25.0	20.2	Secchi 4	Oct. 25 8 ^h	Rome.
23.8	- 2.4	17.0	Kaiser II. 2	64 Nov. 11 10 ^h 30 ^m	Leiden.
24.0	- 3.0	17.2	Dawes 10	14 12 ^h 0 ^m	Gr.
24.3	- 1.9	16.8	Franzenau I.	8 9 ^h 30 ^m	Vienna.
26.7	-21.3	22.9	Lockyer I. 3	62 Sept. 23 12 ^h 55 ^m	Gr.
28.2	- 2.1	16.9	Kaiser II. 1	64 Nov. 9 9 ^h 35 ^m	Leiden.
29.0	-25.1	20.0	Secchi 5	62 Oct. 26 9 ^h 15 ^m	Rome.
39.5	-25.3	19.5	Rosse 5	29 1 ^h	Sid. T. Birr C.
45.0	-26.5	13.4	Kaiser I. 7	Dec. 2 8 ^h 35 ^m	Leiden.
48.2	-25.0	20.2	Lassell 15	Oct. 25.38	Gr.
49.1	- 2.6	17.1	Dawes 12	64 Nov. 12 12 ^h 30 ^m	„
49.4	-20.7	22.5	Lockyer I. 4	62 Sept. 17 10 ^h 50 ^m	„
49.8	- 9.7	15.7	Kaiser II. 7	64 Dec. 18 10 ^h 0 ^m	Leiden.
? 59	-20.7	22.5	Lockyer II. 1	62 Sept. 17 ?	
60.5	- 2.3	17.0	Dawes 13	64 Nov. 10 12 ^h 6 ^m	Gr.
69.2	-24.8	20.5	Lassell 14	62 Oct. 23.39	„
75.1	-10.1	11.2	Dawes 15	65 Jan. 21 8 ^h	„
77.0	-24.6	20.9	Lassell 13	62 Oct. 25.36	„
80.8	-20.5	22.1	„ 1	Sept. 13.439	„
83.8	- 9.3	16.0	Kaiser II. 8	64 Dec. 15 10 ^h 30 ^m	Leiden.
85.3	-24.2	21.4	Secchi 3	62 Oct. 18 8 ^h 13 ^m	Rome.
86.2	-20.6	22.4	Rosse 3	Sept. 16 23 ^h 55 ^m	Sid. T. Birr C.
86.4	-24.9	20.4	Kaiser I. 3	Oct. 24 11 ^h 25 ^m	Leiden.
94.3	-24.2	21.4	Lockyer II. 2	Oct. 18 8 ^h	Gr.
113.5	-20.5	22.2	Rosse 2	Sept. 14 0 ^h 26	Sid. T. Birr C. (assuming the time to be 0 ^h 26 ^m instead of 6 ^h 26 ^m)
118.8	-26.5	14.8	Kaiser I. 6	Nov. 23 7 ^h 50 ^m	Leiden.
119.8	-26.5	15.0	Lassell 22	22.29	Gr.
123.2	- 8.4	16.6	Kaiser II. 6	64 Dec. 10 10 ^h 10 ^m	Leiden.
127.5	- 1.2	16.4	Dawes 2	Nov. 3 12 ^h 24 ^m	Gr.
128.3	-24.2	21.4	Lassell 12	62 Oct. 18.43	„

Areographical
Long. and Lat. of the
Centre of the Disk.

Diameter.

Times assigned to the Sketches.

137.2	-24.1	21.5	Lassell 11	17.43	Gr.
137.5	-23.9	21.8	Lockyer II. 3	15 9 ^h 8 ^m	"
140.5	"	"	" II. 4	past 9 ^h 20 ^m	"
144.4	-23.9	"	Lassell 10	15.40	"
153.7	-26.4	15.7	" 21	Nov. 18.28	"
162.1	-23.7	22.0	" 9	Oct. 13.40	"
162.3	-26.5	15.5	Kaiser I. 5	Nov. 19 8 ^h 15 ^m	Leiden.
163.0	-26.4	15.8	Lassell 20	17.28	Gr.
168.1	-26.4	16.1	Secchi 8	16 7 ^h 16 ^m	Rome.
179.7	-23.4	22.3	Lassell 8	Oct. 11.40	Gr.
188.6	-26.3	16.3	" 19	Nov. 15.30	"
195.8	-23.4	22.3	Kaiser I. 2	Oct. 11 11 ^h 0 ^m	Leiden.
199.9	-10.8	12.9	" II. 12	65 Jan. 7 8 ^h 0 ^m	"
201.2	-23.4	22.3	Lockyer III. 1	62 Oct. 11 11 ^h 4 ^m	Gr.
214.7	-23.1	22.5	" III. 2	9 10 ^h 47 ^m	"
220.1	-6.2	17.3	Kaiser II. 5	64 Nov. 29 10 ^h 10 ^m	Leiden.
221.4	-26.2	17.1	Secchi 7	62 Nov. 11 7 ^h 45 ^m	Rome.
233.7	-6.6	17.3	Dawes 4	64 Dec. 1 12 ^h 0 ^m	Gr.
236.4	-10.8	13.5	Kaiser II. 11	65 Jan. 3 8 ^h 0 ^m	Leiden.
238.1	-26.1	17.4	Secchi 6	62 Nov. 9 7 ^h 38 ^m	Rome.
240.2	-20.2	21.3	Harkness 1	Sept. 6 12 ^h	Washgt.
248.7	-4.2	17.4	Franzenau 4	64 Nov. 20 7 ^h 30 ^m	Vienna.
253.0	-4.6	17.5	" 6	22 9 ^h 0 ^m	"
263.3	-22.4	22.9	Lockyer III. 3	62 Oct. 3 10 ^h 30 ^m	Gr.
264.1	-26.0	11.7	Kaiser I. 9	Dec. 14 6 ^h 45 ^m	Leiden.
271.8	-22.7	22.9	" I. 1	Oct. 5 12 ^h 35 ^m	"
274.3	-5.6	17.4	Dawes 6	64 Nov. 26 11 ^h 46 ^m	Gr.
276.2	-22.4	22.9	Lockyer III. 4	62 Oct. 3 11 ^h 23 ^m	
278.0	-23.2	14.6	Rosse 1	July 22 22 ^h 30 ^m	Sid. T. Birr C.
280.4	-4.2	17.4	Franzenau 5	64 Nov. 20 9 ^h 40 ^m	Vienna.
283.0	-22.4	22.9	Lockyer IV. 1	62 Oct. 3 11 ^h 51 ^m	Gr.
283.3	-22.8	22.7	Rosse 4	6 2 ^h 10 ^m	Sid. T. Birr C.
287.6	-25.9	18.1	Lassell 18	Nov. 5.32	Gr.
290.2	-4.7	17.5	Kaiser II. 4	64 Nov. 22 10 ^h 45 ^m	Leiden.
290.8	-10.6	14.3	" II. 10	Dec. 28 8 ^h 0 ^m	"
295.9	-21.9	23.0	Lassell 7	62 Sept. 29.43	Gr.
296.7	-25.8	18.3	" 17	Nov. 4.32	"

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Areographical Long. and Lat. of the Centre of the Disk.		Diameter.		Times assigned to the Sketches.	
°	'	"			
300.2	-26.1	12.1	Lassell 24	Dec. 11.29	Gr.
301.8	-21.6	23.0	Secchi 2	Sept. 26 9 ^h 45 ^m	Rome.
320.5	-21.7	23.0	Lassell 6	27.45	Gr.
322.1	- 3.2	17.3	Franzenau 3	64 Nov. 15 9 ^h 30 ^m	Vienna.
324.2	-26.2	12.3	Kaiser I. 8	62 Dec. 10 8 ^h 15 ^m	Leiden.
324.6	- 4.2	17.4	Dawes 8	64 Nov. 20 11 ^h 36 ^m	Gr.
325.2	- 4.0	17.4	Kaiser II. 3	19 11 ^h 20 ^m	Leiden.
328.8	-26.3	12.5	Lassell 23	62 Dec. 8.29	Gr.
328.9	-25.9	17.9	Rosse 6	Nov. 6 1 ^h 40 ^m	Sid. T. Birr C.
332.4	-21.1	22.8	Secchi 1	Sept. 21 20 ^h 50 ^m	Sid. T. Rome.
334.5	-21.5	22.9	Lassell 5	25.44	Gr.
337.2	"	"	Lockyer IV. 2	10 ^h 44 ^m	Finished.
338.6	"	"	" IV. 3	10 ^h 50 ^m	"
339.2	-21.3	22.9	" IV. 4	23 9 ^h 40 ^m	"
343.4	-21.4	22.9	Lassell 4	24.44	"
344.4	-25.5	19.1	Kaiser I. 4	Oct. 31 8 ^h 45 ^m	Leiden.
350.2	-21.3	22.9	Lockyer I. 1	Sept. 23 10 ^h 25 ^m	Gr.
356.5	-10.2	15.0	Kaiser II. 9	1864 Dec. 23 9 ^h 25 ^m	Leiden.

On account of the uncertainty of the times assigned to the sketches, the longitudes of the central meridian may, of course, be considerably uncertain, an uncertainty of 1° of areographical longitude corresponding to about 4^m.1 in time.

By interpolating the longitudes given in the Ephemeris for the times, when observations are to be taken, and consulting the corresponding sketches, trustworthy observers may properly prepare themselves for fixing their attention upon the most desirable observations which can then be made. Amongst the most important are careful observations of the times and places of the passages across the central meridian of all the most distinct and well defined points on the planet's surface, which may serve as fundamental points of Areography. Foremost amongst them are the point *f* (the neck of the hour-glass), the spot *a* (the end of the serpentine), and the centre of spot *d* (the pupil of the eye) of Mädler's map of 1830. Since, in observing, the diameter of the disk—which passes through the southern polar spot *S*—will have to be taken as the central meridian, the observations will require to be corrected, not only for phase, for which the Ephemeris supplies the necessary data, but also for the non-coincidence of *S* with the southern pole, for the determination of which series of carefully observed angles of position of *S* are required. It is to be hoped that astronomers who have the requisite instruments at their service will not let slip the opportunities of the approaching opposition for making substantial contributions towards our better knowledge of *Mars*.